What is claimed is:

1. In a pneumatic tire comprising a carcass comprised of at least one carcass ply containing a steel cord(s) arranged at a cord angle of 70-90° with respect to an equatorial plane of the tire and toroidally extending between a pair of bead cores and turned up around the bead core inward or outward in a radial direction to form a turnup portion, the improvement wherein a wrap part wrapping on a peripheral face of the bead core therealong is formed in the turnup portion of the carcass ply.

2. A pneumatic tire according to claim 1, wherein at least one plastic deformation region is formed in the wrap part.

3. A pneumatic tire according to claim 2, wherein the plastic deformation region is formed in a portion of the carcass ply corresponding to the warp part prior to the winding of the carcass ply around the bead core.

4. A pneumatic tire according to claim 1, wherein at least the wrap part of the turnup portion is interposed between the bead core and a bead filler.

5. A pneumatic tire according to claim 1, wherein the wrap part is extended along the peripheral face of the bead core over a half periphery of the sectional profile of the bead core.

6. A pneumatic tire according to claim 1, wherein an outer end of the turnup portion is located inward from an outer circumferential edge of a bead portion at a contact region with a rim flange in the radial direction of the tire.

7. A pneumatic tire according to claim 1, wherein the end of the wrap part is located inside in the radial direction over a position corresponding to an outer peripheral edge of a bead core embedded in a bead portion at a state of mounting onto a rim in the inflation under a maximum air pressure.

8. A pneumatic tire according to claim 1, wherein the tire has an aspect ratio of not more than 60%.

9. A pneumatic tire according to claim 1, wherein the steel cord has a

tenacity of 80-300 kgf.

10. A pneumatic tire according to claim 1, wherein a displacement (d) of a point X changed from a deflate state to an inflate state is not more than 3 mm as measured at a section in the widthwise direction of the tire, wherein X is an arbitrary point on a carcass line located in a region of the bead portion outward from a contact region with a rim flange at the deflate state when the tire is mounted onto a recommended rim.

11. A pneumatic tire according to claim 10, wherein the tire satisfies a relation of $R_0<2H$, preferably $R_0<H$ when a radius of curvature of the carcass line at the point X is $R_0$ and a section height of the tire is H at the deflate state.

12. A pneumatic tire according to claim 1, wherein a rubber layer controlling shearing strain is arranged between a bead filler and a bead portion reinforcing layer located at an outside of the tire.

13. A pneumatic tire according to claim 12, wherein the rubber layer has a hardness middle between hardness of the bead filler and hardness of a sidewall rubber constituting a sidewall portion together with the bead filler.

14. A pneumatic tire according to claim 13, wherein a ratio of the hardness of the bead filler to the hardness of the sidewall rubber is not less than 1.4 times.

15. A pneumatic tire according to claim 12, wherein when the thickness of the rubber layer is $t_2$ and the thickness of the bead portion reinforcing layer is $t_1$, the thickness of the rubber layer satisfies a relation of $0.3t_1 \leq t_2 \leq 5t_1$.

16. A pneumatic tire according to claim 12, wherein an end of the rubber layer is located at a position corresponding to an upper part of the bead core, and the other end thereof is extended along the bead portion reinforcing layer and protruded from an end of the reinforcing layer by 30 mm at maximum.

17. A pneumatic tire according to claim 16, wherein an end of the rubber layer existing in a position corresponding to an upper part of the bead core contacts with the turnup portion of the carcass ply.

18. A pneumatic tire according to claim 1, wherein a recess zone is formed in an outer profile of the bead portion located inward from a position of a maximum tire width in the radial direction of the tire at a radial section of the tire.

19. A pneumatic tire according to claim 18, wherein a rubber gauge in a region ranging outward from a position corresponding to 1.8 times a maximum bead portion width located from a position of a nominal diameter of a rim flange in the radial direction of the tire to the position of the maximum tire width is substantially equal to a rubber gauge at the position of the maximum tire width.

20. A pneumatic tire according to claim 18, wherein the recess zone is arranged outward from an alienation point between the outer surface of the bead portion and the rim flange in the radial direction of the tire when the tire is mounted onto a recommended rim and stated at a maximum air pressure under a maximum load.

21. A pneumatic tire according to claim 18, wherein a thickness $W_P$ of the bead portion at the alienation point P between the outer surface of the bead portion and the rim flange at the inflation state of the maximum air pressure under the maximum load after the mounting onto the recommended rim satisfies a relation of $W_P/W_M \geq 0.9$ when a width of the bead portion passing through a illustrated center of the bead core in parallel to a standard line of the bead portion thickness at the alienation point P is $W_M$.

22. A method of manufacturing a pneumatic tire as claimed in anyone of claims 1 to 21, which comprises subjecting a cylindrical carcass band to a forming treatment by bending each end portion of the band in at least one

place in an axial direction of a green tire over a full circumference thereof inward or outward in a radial direction of the tire, arranging a ring-shaped bead core on an inside of the bent end portion, toroidally expanding the cylindrical carcass band while locking the bead core, and then joining a belt and a tread onto an outer peripheral side of the carcass band.

23. The method according to claim 22, wherein each end portion of the cylindrical carcass band is simultaneously bent at plural positions in the axial direction or in a given order.

24. The method according to claim 23, wherein the bending at the each end portion of the cylindrical carcass band is carried out by relatively displacing a bending means and a cylindrical carcass band in the circumferential direction of the cylindrical carcass band.

24. The method according to claim 22, wherein the arrangement of the bead core at the inside of the bent end portion is carried out by subjecting the bent end portion to elastic deformation in an opening direction.

25. The method according to claim 22, wherein the bend end portion is subjected to stitching at a state of toroidally expanding the cylindrical carcass band while locking the bead core.

26. The method according to claim 22, wherein the cylindrical carcass band is made from steel cords.

27. An apparatus for bending a carcass band for use in the manufacture of the pneumatic tire, comprising a shaft-shaped member provided with an annular groove supporting an end portion of a cylindrical carcass band from an inner or outer circumferential side thereof, and a disc-shaped member located in a position corresponding to the annular groove and pushing the cylindrical carcass band into the annular groove.

28. An apparatus according to claim 27, wherein a plurality of annular grooves are formed on the shaft-shaped member at given intervals and disc-

shaped members in accordance with the number of the annular grooves are arranged side by side in the same axial line.

29. An apparatus according to claim 27, wherein at least one of the cylindrical carcass band, shaft-shaped member and disc-shaped member is connected to a rotation driving means.

30. An apparatus according to claim 27, wherein at least one of the shaft-shaped member and the disc-shaped member is rotated on its axis and a driving means for revolving both the members is arranged around the circumference of the cylindrical carcass band.

31. An apparatus for manufacturing a pneumatic tire, comprising a carcass band drum forming a cylindrical carcass band, a carcass band bending apparatus for subjecting an end portion of the cylindrical carcass band located on the carcass band drum to bending formation, a bead setter for arranging a ring-shaped bead core inside the bent end portion of the cylindrical carcass band, a bead lock for supporting the bead core arranged on the bend end portion from its inner peripheral side, and a shaping means for toroidally expanding the cylindrical carcass band.

32. An apparatus according to claim 31, wherein the shaping means is added to the carcass band drum.

33. An apparatus according to claim 31, wherein the shaping drum provided with the shaping means is disposed irrespectively of the carcass band drum and a transportation means for transporting the formed cylindrical carcass band into the shaping drum, and the carcass band bending apparatus and the bead setter can be added to the transportation means.